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How digitalization is revolutionizing the aerospace industry

Compared to other industries, aerospace and defense firms have quickly embraced digitalization as the future of the sector. While many leading companies are already unlocking the benefits of cutting-edge technologies like the Internet of things, digital twins, AI and data analytics, few organizations have comprehensively capitalized on digitalization.

With growing pressure to develop more-electric aircraft, reduce time-to-market and quickly adapt to changing regulations, A&D firms need every advantage they can get to move with agility. In this article, we'll explore a few examples of how digitalization is radically reshaping the A&D industry.

Understanding the entire product lifecycle with the Internet of things and digital twins

One of the biggest challenges in the aerospace industry is efficiently designing, manufacturing and maintaining incredibly complex products and aircraft. Businesses must maximize profit margins all while complying with the latest standards and regulations to deliver products that can perform in a broad range of extreme conditions. With the Internet-of-Things and digital twins, aerospace and defense companies gain a huge advantage in this area.

With various sensors and IoT devices, companies can track the status of every single component in an aircraft. In doing so, they can rapidly generate extraordinary amounts of data which can then be used to create digital twins to study the performance and status of every aircraft in a given fleet. These digital twins are highly accurate digital representations of real-life assets, products, aircraft, machinery, production processes and even fleets.

This offers aerospace manufacturers an unprecedented look at how their aircraft perform over the products' lifetimes, opening up a wealth of opportunities for streamlining product design, production design, improving quality and even optimizing maintenance schedules. Let's explore these opportunities a little further.

Engineering for excellence and reducing time-to-market

A large inefficiency in the design of new aerospace and defense products is the process of quality testing and certification. Between the stringent safety standards of this industry and the complexity of the products, manufacturers typically must go through an expensive and time-consuming process perfecting new designs or changes to existing designs.

With comprehensive, high-fidelity digital twins of a component, engineers can design, test, and prototype any new design entirely virtually. Furthermore, they can utilize nearly

instantaneous access to real-life data gathered by IoT devices in manufacturing facilities, airports, in-flight aircraft, and anywhere else their products may be found. By harnessing the expansive, rich datasets gathered by the IoT and pairing it with next-generation analytics and AI, engineers can predict the performance of new designs like never before.

This incredible understanding of products allows the design phase to be completed with significantly greater efficiency, boosting quality and identifying design flaws that may have gone unnoticed with traditional tools. By pairing digital twins of a product with digital twins production design, manufacturers can take this efficiency to the next-level with a streamlined, optimized production process.

With this platform, companies can considerably improve time-to-market, first time quality, mean time for new production introduction, and on-time delivery. In fact, with the use of these tools, one of our clients, an aircraft engine manufacturer, was able to reduce the time for engineering changes to be implemented on the shop floor from a full week to just half an hour.

Using data analytics for predictive maintenance

One of the most impressive capabilities of a digital aerospace enterprise is the ability to optimize services across a product's entire lifecycle. In addition to engineering better products in a shorter amount of time, the IoT and data analytics allow businesses to actually predict when an aircraft needs to be serviced for optimal performance. By monitoring an aircraft's performance and status in real-time, a company could prepare for any necessary repairs or maintenance before the aircraft has even landed.

Thinking more broadly, an aerospace company could completely rethink maintenance schedules around a digital platform, even eliminating the need for manual inspections. A maintenance team can receive a notification for any component when it falls below certain quality thresholds and avert disaster by fixing issues before they occur. In an industry where maintenance is such an enormous expense and time sink, this offers aerospace companies tremendous cost-savings and better service for their customers.

Will your organization be a first-mover?

Digitalization is a journey - it's not something any organization can achieve overnight. However, the short-term and long-term gains of putting digital technologies at the core of your A&D business are enormous. The businesses that move first to capitalize on these technologies will rapidly outpace those with slower, more expensive and rigid processes for designing, manufacturing and servicing products.

Most any A&D executive will agree that digitalization is key to long-term success. However, many organizations have not prioritized digitalization or they haven't crafted a concrete plan for their digitalization journey.

The difference between first-movers and others will be billions in revenue and vast gains in market share...so what are you doing today to position yourself for digitalization success?

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